



Seat No. : _____

TJ-114

BBA Semester-I

May-2013

BASICS OF MATHEMATICS

Time : 3 Hours]

[Max. Marks : 70

1. (a) Define the following terms :
- (1) Empty set
 - (2) Universal set
 - (3) Finite set
 - (4) Intersection of sets

4

OR

If A, B and C are any three sets prove that $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$.

- (b) In a college, there are 500 girls and of them 300 have taken Economics and 250 have taken Mathematics. How many of them have taken both the subjects ? All girls have taken at least one of these two subjects.

5

OR

If $A = \{2, 3, 4\}$, $B = \{3, 4, 5, 6\}$, $C = \{2, 4, 6, 8\}$. verify that

- (i) $A \cup B = (A - B) \cup B$
 - (ii) $A - (B - C) = (A \cap B) - (A \cap C)$
- (c) If $u = \{a, b, c, d, e, f, g\}$, $A = \{a, c, d, f\}$ and $B = \{b, c, f, g\}$ then verify the following :

- (i) $(A \cup B)' = A' \cap B'$
- (ii) $(A \cap B)' = A' \cup B'$

5

OR

If $A = \{x/x^2 - 17x + 60 = 0\}$

$B = \{x/x^2 - 7x + 12 = 0\}$

Find $(A \cup B)$ and $A \cap B$.

2. (a) Define the following terms :
- (1) Equal function
 - (2) One-one function
 - (3) Many-one function
 - (4) Constant function

4

OR

If $f(x) = x^2 (x - 1)^2$, $x \in \mathbb{R}$. Find the value of $f(x + 1) - f(x)$.

- (b) (i) If $f(x) = \frac{1}{x}$, $x \in \mathbb{Z} - \{-1, 0, 1\}$, prove that $f(x+1) - f(x-1) = \frac{2}{1-x^2}$
- (ii) If $f(x) = x^3 - 2x + 1/x$, find the value of $f(x) + f(-x)$ 4

OR

A text-book publisher finds that the production cost of each book is ₹ 30 and the fixed cost is ₹ 15,000. If each book can be sold for ₹ 45, the determine

- (i) The Cost function
- (ii) The Revenue function
- (iii) The break-even point
- (c) Evaluate following limits : (any **three**) 6

(i) $\lim_{x \rightarrow -1} \frac{x^{17} + 1}{x^{15} + 1}$

(ii) $\lim_{n \rightarrow \infty} \frac{\sqrt{n^4 - 3n + 8}}{n^2 + 7n - 1}$

(iii) $\lim_{x \rightarrow 1} \frac{\sqrt{x+2} - \sqrt{5}}{x-3}$

(iv) $\lim_{x \rightarrow 1} \frac{x^{5/2} - 1}{x^{3/2} - 1}$

OR

Evaluate the following :

(1) $\lim_{x \rightarrow 1} \frac{\sqrt{3+x} - \sqrt{5-x}}{x^2 - 1}$

(2) $\lim_{x \rightarrow \infty} \frac{x^3 + 1}{(x^2 + 2)(x + 3)}$

(3) $\lim_{x \rightarrow 1} \frac{x^{7/3} - 1}{x^{2/3} - 1}$

(4) $\lim_{x \rightarrow 0} \left[\frac{1}{x} \left(\frac{2x+9}{x+3} \right) - 3 \right]$

3. (a) Find k if ${}^8P_5 = {}^7P_5 + k {}^7P_4$ 4

OR

Find the value of n.

$${}^{2n}C_3 = 11 \cdot {}^nC_3.$$

- (b) Out of six men and four women in how many ways a committee of five members can be formed in which
- (i) there are at the most 2 of women.
 - (ii) a particular men is included and a particular women is excluded. 5

OR

How many four digit numbers which are divisible by 5 can be formed with 0, 1, 4, 6, 5, 8, 9

- (c) How many different numbers of five digits can be formed by using all digits of number 60421 ? 5

OR

A man has 7 friends in which there are 3 females. He wants to invite 8 friends on a dinner such that at least one female must be included among invites. In how many ways can be invited them ?

4. (a) The sum of 6 terms of an A.P. is 57 and the sum of its 10 terms is 155, find the 20th term. 4

OR

The sum of three numbers in A.P is 24 and sum of their squares is 200. Find the number.

- (b) Find the sum of the first n terms of the series $5 + 55 + 555 + 5555 + \dots$ 5

OR

The fourth and the seventh term of a G.P are 72 and 576, find the sum of first n terms.

- (c) Obtain equation of the line passing through (3, 1) and the point of intersection of $4x + 5y + 7 = 0$ and $3x - 2y - 12 = 0$. 5

OR

Find the equation of a line passing through the point of intersection of the lines $2x + 7y - 9 = 0$ and $3x + 2y - 5 = 0$ and perpendicular to $5x + 2y + 11 = 0$.

5. Answer the following : 14

- (1) If $A = \{1, 3, 5, 7, 9\}$;
 $B = \{2, 4, 6, 8, 10\}$
 $C = \{3, 4, 7, 8, 11, 12\}$
Find $A \cup B \cup C$.

- (2) Define infinite set.

- (3) If $A = \{1, 2, 3\}$ $B = \{2, 3, 4\}$, $S = \{1, 3, 4\}$
 $T = \{2, 4, 5\}$ find $(A \times B) \cap (S \times T)$

- (4) If $f(x) = x(x + 1)(2x + 1)$ find $f(x - 1)$

(5) If $f: \mathbb{Z} - \{-1\} \rightarrow \mathbb{Z}$, $f(x) = \frac{x^3 + 1}{x + 1}$; $x \in \mathbb{Z} - \{-1\}$.
 $g: \mathbb{Z} \rightarrow \mathbb{Z}$ $g(x) = x^2 - x + 1$; $x \in \mathbb{Z}$ examine whether the functions are equal.

(6) $g(x) = \frac{x^3 - 1}{x^3 + 1}$ $\therefore g(1) =$

(7) $g(x) = 5x + 2$, $x \in \mathbb{N}$ and $g(x) = 17$ there $x =$ _____.

(8) $\lim_{x \rightarrow -2} \frac{x^3 + 8}{x^2 + 8x + 12} =$ _____.

(9) Find the value of ${}^{10}C_4$.

(10) If ${}^{14}P_x = 2184$ find x .

(11) Find the slopes of lines joining the following pairs of points.
(7, 11) (5, 2)

(12) Find the equation of line with slope $1/3$ and passing through $(-2, 7)$

(13) Find the 30th terms of
10, 14, 18, 22 30th terms.

(14) Find the sum of
256 + 128 + 64 + 8 terms.
